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Protective and Risk Factors Associated with Posttraumatic Growth and Psychopathological Symptoms Following Trauma

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PROTECTIVE AND RISK FACTORS ASSOCIATED WITH POSTTRAUMATIC GROWTH AND PSYCHOPATHOLOGICAL SYMPTOMS FOLLOWING TRAUMA

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DISSERTATION APPROVAL

This is to certify that the thesis presented to us by ___Jessica Henninger_____

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acceptable in both scholarship and literary quality.

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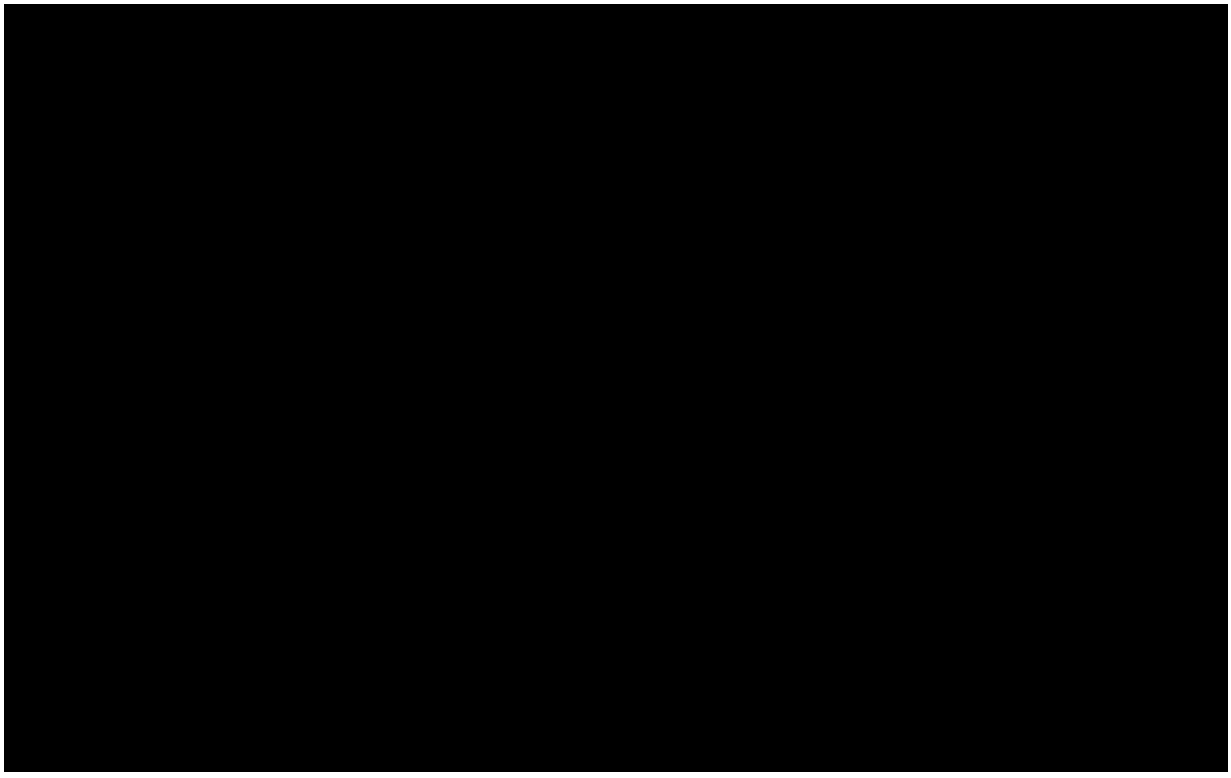

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ABSTRACT

Most people experience at least one traumatic event in their lifetimes, yet only a small proportion of individuals develop posttraumatic stress disorder. Many studies have examined risk factors associated with psychopathological symptoms in individuals with trauma, but few have examined protective factors associated with posttraumatic growth, and even fewer have examined risk and protective factors concurrently. Factors that contribute to discrepancies between individuals who experience pathology and those who experience growth are unclear Recent studies suggest that mild stressful life events in childhood may impact the way in which an individual experiences later stress via a strengthening or "steeling" effect. In a sample of 523 individuals who endorsed direct traumatic exposure, risk factors (i.e., number of traumas, heightened arousal, and number of previous pathological diagnoses) and protective factors (i.e., optimism, cognitive flexibility, and social support) significantly predicted pathology, as evidenced by total scores on the Brief Symptom Inventory. In a separate regression model, protective and risk factors significantly predicted growth, as evidenced by scores on the Posttraumatic Growth Inventory, but the effect size was small. A Pearson product-moment correlation revealed a negative relationship between the number of protective factors and pathology and a positive relationship between the number of protective factors and growth. However, growth was not significantly correlated with pathology. Individuals who endorsed low, moderate, and high posttraumatic growth did not significantly differ on the number of stressful life events endorsed on the Life Events List. While risk and protective factors appear to predict negative outcomes, this study suggested that the processes by which individuals demonstrate growth or pathology may be independent.

CHAPTER 1: INTRODUCTION

Statement of the Problem

According to the American Psychological Association (2004), most people experience at least one traumatic event in their lifetimes; other research suggests that this estimate may be 70% or even as high as 89.7% (Kilpatrick et al., 2013; Sidran Institute, 2016). The Center for Epidemiology of Disasters suggests that the number of both naturally occurring and man-made disasters, such as those resulting from conflict, continues to increase (Ganeshan & Diamond, 2009). Yet, according to the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5;* American Psychiatric Association [APA], 2013), the lifetime prevalence of posttraumatic stress disorder (PTSD) in the United States remains relatively low (8.7%). Factors that account for such a large disparity among outcomes associated with individuals who experience trauma are unclear. Why does only a small percentage of individuals who have experienced trauma develop pathology while other individuals remain symptom free?

According to the *DSM-5* (2013), trauma is defined as "exposure to actual or threatened death, serious injury, or sexual violence" (APA, 2013, p. 271). This could be in the form of direct exposure, witnessing someone else experiencing the event, or learning that a traumatic event happened to a close family member or friend (APA, 2013). Trauma is, by definition, a subjective experience. As a result, many factors, such as external experiences (e.g., early-childhood experiences, family dynamics, coping strategies) and internal experiences (e.g., appraisal, resilience, perceived support) could

potentially influence the way in which individuals process trauma. Some of these factors may be more predictive of negative outcomes while others factors may be more predictive of positive outcomes.

In 1998, Felitti et al. (1998) published a landmark study, typically referred to as the Adverse Childhood Experiences (ACEs) Study, outlining the relationship between adverse childhood experiences and later medical and mental health outcomes. Results from this study suggested that individuals who experienced early-childhood trauma, such as physical and/or sexual abuse, were much more likely than their peers to experience mental health pathology and certain medical conditions in adulthood. However, that same year, Calhoun and Tedeschi (1998) published a study emphasizing a phenomenon they coined *posttraumatic growth* in which individuals seem to actually benefit from traumatic exposure. Calhoun and Tedeschi (1998) purported that the traumatic exposure and an individual's ability to survive yielded significant cognitive changes, such as individuals learning what is really important in life or reconnecting with spiritual practices. While Felitti et al. (1998) found that early adverse events in childhood significantly predicted negative outcomes for two thirds of the participants who endorsed abuse, one third of them essentially did not develop or manifest such outcomes. These individuals might have been able to cope with the abuse effectively. Calhoun and Tedeschi's (1998) research provided evidence for strategies that may lead to better outcomes. Specifically, if individuals who endorse growth following trauma describe changes in their relationships or reorganization of their priorities, intentional teaching of these strategies to clients who have experienced a trauma may possibly elicit more positive outcomes in a therapeutic setting.

Evidence-based treatments, such as cognitive reprocessing (Forbes et al., 2012) and prolonged exposure (Foa et al., 2005), purport to support individuals in reprocessing traumatic events to identify and balance maladaptive thoughts related to the event and help individuals learn that the thoughts associated with the previous trauma are not in and of themselves dangerous. With continued exposure and processing of such events, both the cognitive and emotional impacts of these events can be decreased (Foa et al., 2005). Typically, evidence-based treatments for PTSD are used after symptoms manifest. What if clinicians could provide treatment prior to the development of symptoms? What if psychology could prevent pathology in the area of trauma? Positive coping skills could be taught in schools or in settings considered to be at greater risk for trauma, such as military settings (Sadeh et al., 2017) and urban communities, particularly those of low socioeconomic status (Cross et al., 2018; Gold, 2018).

Research in other populations in regard to mental health is already making strides in the area of prevention. The U.S. Preventative Services Task Force released a draft recommendation statement in August 2018 (later published in February 2019) for the treatment of postpartum women to prevent perinatal depression. Researchers found that disseminating screening tools, such as the Edinburgh Postnatal Depression Scale, to women who were either pregnant or had delivered a baby within the previous 12 months was an effective strategy to identify individuals who were at risk for developing symptoms consistent with major depressive disorder. They then provided various types of treatment to these individuals and found that cognitive-behavioral therapy and interpersonal therapy were evidenced-based strategies for the prevention of perinatal depression (U.S. Preventative Services Task Force, 2018).

Similar efforts are being made in the area of trauma, with some success. Sijbrandij et al. (2015) examined the preventative effects of pharmacological treatments in individuals who had experienced a trauma. They conducted their meta-analysis by examining individuals who were prescribed beta blockers, hydrocortisone, and selective serotonin reuptake inhibitors (SSRIs) within 1 month of being exposed to a traumatic event. They found some evidence to suggest that hydrocortisone may prevent PTSD following trauma. Unfortunately, their study did not find significant effects when randomized control trials were included in their analyses. Bolton et al. (2017) suggested that most research on the effectiveness of psychopharmacological interventions aimed at the prevention of PTSD has similar methodological limitations. such as small sample size or lack of randomly controlled trials. More research is needed to identify medications or other treatments that may be helpful in preventing or decreasing the subsequent impact of trauma.

Rothbaum et al. (2012) provided early intervention to individuals presenting in the emergency department following a traumatic injury with positive effect. After providing three 1-hour prolonged exposure sessions, they found significantly fewer posttraumatic stress reactions and less overall depression at 4- and 12-week follow-up sessions. However, this study had a relatively small sample size (n = 137), suggesting more research is needed to determine the generalizability of their findings.

Trauma may also be viewed as a more complex pathology compared to perinatal depression because outcomes can vary according to type of trauma (e.g., natural disaster, physical/sexual assault, vehicular accident, combat exposure), coping strategies, appraisal, and other factors. This may account for the controversial literature currently

available regarding which coping skills are most effective for which individuals under which specific circumstances. Therefore, taking a broader scope of preventative efforts may be beneficial. Bolton et al. (2017) did just that in their meta-analysis of studies aimed at preventing the manifestation of symptoms that meet full criteria for PTSD following *potentially traumatic events* (PTEs; p. 483). Interventions, including debriefing, psychopharmacology, brief cognitive-behavioral therapy, and psychological first aid, have attempted to moderate pathology following exposure to PTEs with varying degrees of effectiveness (Bolton et al., 2017).

The more pressing question, however, seems to be who should receive these interventions. One way to address this is to evaluate individual risk factors associated with PTSD. Bolton et al. (2017) identified several risk factors in the literature, including gender (female individuals appear to endorse more PTSD), lower cognitive functioning, lower levels of education, difficult temperament in early childhood, negative attitudes toward life in general, general patterns of avoidance as a coping strategy, prior exposure to traumatic events, previous history of psychiatric symptoms, lower social support, and lower tolerance for emotional distress. Research aimed at identifying these factors may contribute to identifying individuals at risk for developing PTSD, in turn possibly assisting the development of preventative strategies. King et al. (2012) emphasized the importance of using an analytical model that includes both risk and protective factors. However, at present, the risk factors most clearly linked to negative outcomes are not known, and no measures known to date measure risk and protective factors concurrently. King et al. (2012) also acknowledged the need to account for developmental changes throughout a lifetime because traumatic events that occur during one developmental stage may have

effects different from those of traumatic events that occur during a different stage. Studies that use a longitudinal model might be able to account for such a dynamic developmental perspective, but such models would also have the inherent disadvantage of time as a confounding variable (King et al., 2012). For example, a model that predicts outcome at a certain point in time based on known risk and protective factors may not account for change that occurs naturally over time based on the developmental stage of the individual. Few studies have evaluated the concurrent predicted value of risk and protective factors, and apparently none of these studies have evaluated effects using a longitudinal model that would account for a developmental perspective. Understanding the developmental history of individuals would likely augment the clinical understanding and facilitate more comprehensive treatment.

Using a developmental framework, Rutter (2012) reviewed the work by Lyons et al. (2009) that examined the effects of stress related to maternal separation in monkeys. He purported the existence of a strengthening or "steeling" effect that some organisms may experience following trauma (Rutter, 2012). According to his perspective, organisms may become either sensitized to or steeled (strengthened) against a traumatic event. In the former, the organism may develop a vulnerability to future negative outcomes, similar to the model outlined by Felitti et al. (1998). However, in the latter, an organism is thought to build up an immunity to stressors that helps prepare the organism to cope more effectively with future stress (Rutter, 2012).

The idea of a strengthening effect following stress is also reflected in Nassim Taleb's (2012) concept of *antifragility*. Taleb and Geddes (2012) distinguished antifragility from resilience, noting that resilience suggests that an organism, policy, or

system survives adversity and disorder, whereas antifragility suggests that an organism, policy, or system thrives because of adversity and even depends upon adversity/chaos/disorder for growth and evolution. Based on the work completed by Lyons et al. (2007) and Taleb and Geddes (2012), perhaps some experiences of stress inoculate individuals against future trauma, leading to fewer negative outcomes and more positive outcomes. Learning more about which circumstances or factors yield fewer negative outcomes and more positive outcomes could inform more beneficial treatment for individuals who have experienced or may experience trauma.

Purpose of the Study

The purpose of the present study was to examine the predictive value of both protective factors and risk factors as they relate to psychopathological symptoms and posttraumatic growth. Because many prior studies have examined effects only after exposure to one particular trauma type (e.g., vehicular accident), the present study used a broader scope to examine these factors across multiple types of trauma and determine the overall impact of these factors across a diverse population. Specifically, the current study examined the concurrent value of protective factors and risk factors in the prediction of pathology, as well as the value of protective and risk factors in the prediction of growth. In addition, the present study purported to examine the extent to which individuals endorse a steeling effect, that is, whether early childhood experiences with stress were related to trauma outcomes later in life.

In recent years, there has been a movement toward positive psychology and the increased focus on strengths and mental health rather than mental illness (Romano, 2015). This research has adopted a preventative framework (Romano, 2015) through

which clinicians emphasize the personal strengths of individuals. Treatment has shifted toward using these strengths not only to recover from mental health challenges, but also to prevent future symptoms of psychopathology.

Furthermore, these protective factors can be conceptualized as factors that "inoculate individuals and larger systems against the development of risk behaviors that can lead to [later] problems" (Romano, 2015, p. 47). In other words, the present study looked at risk factors thought to predict psychopathological symptom distress and protective factors thought to predict posttraumatic growth. Furthermore, this study evaluated the extent to which steeling contributed to the prediction of pathology or growth in the current model. The present study aimed to provide insight into factors that predict outcomes associated with trauma. If these factors are identified in this study and supported in future research, preventing or otherwise decreasing the impact of trauma may be possible someday.

Research Questions and Hypotheses

In summary, the goal of the current study was to determine the risk and protective factors, if any, that predicted outcomes associated with trauma such as pathology and posttraumatic growth. We were also interested in exploring whether mild early-childhood stress impacted these outcomes. Using a multiple regression model, we hypothesized that risk factors (i.e., number of traumas, heightened arousal, and number of previous pathological diagnoses) and protective factors (i.e., optimism, cognitive flexibility, and social support) would significantly predict pathology as evidenced by total scores on the Brief Symptom Inventory in a sample of individuals who endorsed experiencing or witnessing a traumatic event(s). We also hypothesized that risk and protective factors

would significantly predict posttraumatic growth, as evidenced by scores on the Post Traumatic Growth Inventory. Using a Pearson product-moment correlation coefficient, we hypothesized that as the number of protective factors and posttraumatic growth scores increased, pathology would decrease. Additionally, we hypothesized that individuals who endorsed low, moderate, and high posttraumatic growth would significantly differ on the number of stressful life events endorsed in childhood as evidenced by responses on the Life Events List using a one-way analysis of variance (ANOVA). This would provide evidence in support of the existence of a steeling effect.

CHAPTER 2: REVIEW OF THE LITERATURE

Most individuals (more than 70%) experience a traumatic event in their lifetimes (Sidran Institute, 2016). Yet, according to the American Psychiatric Association (APA), the lifetime prevalence of posttraumatic stress disorder (PTSD) in the United States is 8.7% (APA, 2013). It is unclear why so few individuals develop pathological symptoms following trauma. Some factors must serve to mitigate this relationship. Research does not appear to support a linear relationship between trauma and pathology. Rather, the relationship between trauma, pathology, and other outcomes appears to be highly complete and related to multiple factors in an individual's life.

The *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5;* American Psychiatric Association, 2013)) defines trauma as "exposure to actual or threatened death, serious injury, or sexual violence" (APA, 2013, p. 271). Many studies have indicated that trauma can yield deleterious effects on individuals and lead to the development of psychopathological symptoms (Amstadter & Vernon, 2008; Eftekhari, Zoellner, & Vigil, 2009; Kleim et al., 2012); however, the development of positive effects is possible as well (Sattler et al., 2014). Research suggests that such factors as early-childhood experiences may be related to one's reactions to later trauma exposure (Vogt et al., 2011). Internal and external events that occur prior to, during, and after trauma can impact individuals' abilities to effectively cope with a traumatic experience.

Negative Outcomes

History of Trauma

The relationship between trauma and negative sequalae, such as psychopathological symptoms, has been well documented in the literature. As the trauma literature has proliferated during the last century, so too have mental health professionals' conceptualizations and treatments of symptoms associated with PTSD. Early theorists, such as Sigmund Freud described traumatic events in the late 1800s as early-childhood sexual experiences that were later associated with mental illness in adulthood (Freud; US Department of Health, Education and Welfare, 1971). This early conceptualization seemed to suggest that while an external precipitating event occurred (i.e., trauma), an internal response also impacted outcome; in other words, the individual was thought to be at least partially responsible for the deleterious effects associated with the trauma (Freud; US Department of Health, Education and Welfare, 1971).While not formally identified, this conceptualization appeared to account for the role of appraisals on the individual's response to trauma. While the importance of appraisals has been maintained throughout many studies, a comprehensive discourse on appraisal is beyond the scope of the current document.

During World War I, trauma was referred to as *shell shock*, similarly placing an emphasis on both an external event (combat) and an internal event, the effect of which for some individuals remained long after combat had ceased (Walker, 2017). Walker (2017) opined that not until World War II was a need recognized for psychologists to assess, understand, and treat individuals following traumatic combat experiences. Walker (2017) further emphasized a significant shift in conceptualization, as evidenced by increased normalization of symptoms following traumatic exposure and a subsequent decreased blame on the individual experiencing negative symptoms. For the first time in history,

professionals seemed to be discussing symptoms of PTSD (though not called by name at the time) as a common, albeit unfortunate, response to the highly negative and distressful event of combat.

Since that time, the relationship between trauma and pathology has been widely explored in contexts reaching beyond military combat, and the diagnosis of Posttraumatic Stress Disorder was formally added to the *Diagnostic and Statistical Manual of Mental Disorders* in its third edition (*DSM-III;* American Psychiatric Association, 1980). In 1998, Felitti et al. published the Adverse Childhood Experiences (ACEs) Study, which solidified a link between early-childhood trauma and increased rates of maladaptive outcomes on both mental and medical health. Specifically, Felitti et al. (1998) found that individuals who experienced at least one early-childhood trauma reported increased rates of not only PTSD but also depression, substance use, suicide, obesity, heart disease, cancer, and other medical conditions. Additionally, risk appeared to increase with the number of traumatic events experiences, such that individuals who experienced more than one trauma reported even higher rates of negative outcomes in adulthood than those reported by individuals who endorsed one traumatic event (Felitti et al., 1998). This landmark study emphasized the long-term consequences of early-childhood trauma on negative outcomes in adulthood. Later research also suggested a *dosage effect*, such that the quantity of traumatic experiences (rather that the severity of any particular trauma) may predict overall outcomes (Karam et al., 2013). In a sample of 51,295 participants, Karam et al. (2013 found that individuals who endorsed multiple traumas also endorsed significantly more functional impairment, more comorbidity with other anxiety and mood disorders, and more exposure to abuse or physical assault following the traumatic event

compared to individuals who endorsed only one trauma, despite the trauma severity. In other words, individuals who experienced multiple traumas were even more likely to experience another trauma in the future, though the mechanism of action behind this phenomenon remains unclear.

Proposed Causes of Negative Outcomes

Felitti et al. (1998) proposed that early-childhood adversity may account for significant neurocognitive changes resulting in impaired development. This impairment likely impacts social, emotional, and cognitive aspects of individuals' development, leading to adverse outcomes, such as diminished decision-making and problem-solving skills. These individuals may be significantly more likely to smoke cigarettes or use other substances to cope with emotional distress or to engage in other high-risk behaviors, such as unprotected sex. These maladaptive strategies essentially increase the individual's risk of experiencing disease, disability, and social/emotional distress, even leading to various medical and mental health diagnoses and inadvertently resulting in early death (Felitti et al., 1998). Felliti et al. (1998) found that these effects appeared to increase substantially with each additional traumatic event endorsed.

Further support for the relationship between trauma and negative outcomes that extend beyond PTSD comes from Dutra and Sadeh (2018), who found that veterans with severe trauma presentations were more likely to engage in externalizing behaviors (e.g., aggression), significantly increasing their risk of future additional traumatic exposure, such as physical conflict. Similarly, Cross et al. (2018) found that parents who had experienced a traumatic event were significantly more likely to abuse their children than

parents who did not endorse a history of trauma; parents with a trauma history were also more likely to endorse symptoms of mental health distress.

In addition to negative behavioral sequelae, trauma has also been indicated in other psychopathological symptoms. For example, Amstadter and Vernon (2008) found that individuals who endorsed a history of trauma were significantly more likely to endorse symptoms consistent with generalized anxiety; this correlation was greater when individuals also endorsed patterns of avoidant coping related to the event. Other researchers have highlighted that individuals who experience trauma may later develop symptoms consistent with depression (Coifman et al., 2007; Eftekhari et al., 2009; Hill, 2003). Like Felitti et al. (1998), Hill (2003) suggested that neuroendocrine processes may be involved in predisposing an individual to experience depressive symptoms following an early-childhood trauma, such as abuse. Hill (2003) proposed a mechanism of action involving the hypothalamic-pituitary-adrenal (HPA) axis; early-childhood stress induces hyperactivity of the HPA axis, and hyperactivity of the HPA axis has been associated with increased vulnerability to mental health symptoms in adults. Bomyea et al. (2012) also indicated that biological factors may exist prior to trauma that can predict outcomes. However, a full review of the neurological processes involved in trauma is beyond the scope of the present study.

Similarly, other studies have identified a link between trauma and other pathological symptoms, including schizophrenia (Shannon et al., 2011), substance use disorders (Ouimette et al., 1999), personality disorders (Venta et al., 2012), and eating disorders (Frayne & Wade, 2006; Kong & Bernstein, 2009). Because of this, studies that

broaden their scope of pathology beyond PTSD may account for a greater understanding of individuals who experience distress following trauma.

Hill (2003) also suggested that individuals are not "passive recipients of experience" (p. 5) but rather "active agents" engaging in behaviors that ultimately influence their environments and, in turn, their own experiences. Hill (2003) recognized the complexity of the impact of trauma on individuals. This complexity may be the reason some individuals who experience traumatic events do not demonstrate any psychopathology, but rather seem to actually benefit from the adversity.

Positive Outcomes

Posttraumatic Growth

Despite the evidence for a clear correlation between trauma and negative outcomes, the literature also suggests that many individuals experience positive outcomes following trauma (Feder et al., 2008; Sattler et al.,2014). Many people seem to benefit from exposure to a traumatic event. Experiencing positive outcomes because of trauma was coined *posttraumatic growth* by Calhoun and Tedeschi (1998). They defined posttraumatic growth as the phenomenon by which an individual seems to thrive psychologically following a traumatic event (Calhoun & Tedeschi, 1998). These positive outcomes could include new appreciation of life, relating to others, spirituality change, new possibilities, and personal growth (Calhoun & Tedeschi, 1998). Part of that process, as Calhoun and Tedeschi (1998) suggested, is the result of adaptive coping, as it is necessary to relieve emotional distress; however, the ways in which an individual reacts both cognitively and behaviorally may be related to other protective and risk factors or circumstances following the trauma or to factors that were present prior to the trauma.

Feder et al. (2008), for example, found evidence of posttraumatic growth in a sample of male Vietnam veterans who had been prisoners of war. Using hierarchical regression models, the authors found that these individuals endorsed positive outcomes, including increased optimism, increased social support, and increased adaptive coping following trauma. They concluded that "the capacity to grow psychologically is a key component of the coping process after stressful life events" (Feder et al., 2008, p. 360). These findings provide evidence in favor of the existence of adaptive strategies that may lead to positive outcomes following a traumatic life event.

In a qualitative analysis, Jirek (2017) examined the existence of posttraumatic growth in a sample of individuals who endorsed varying types of trauma, including burglarizing, sexual assault, homicide of loved one, and terminal family illness. Jirek (2017) found that individuals redefined their identities and social roles; developed more realistic and less shatter-prone schemas about the world; and experienced personal transformation, strength, and posttraumatic growth. According to Jirek, the trauma event provided the opportunity for individuals to rewrite their narratives and develop more positive and stronger assumptions about themselves, others, and the world. Just as positive factors may predispose an individual to more positive outcomes, such as posttraumatic growth, negative factors also may predispose an individual to more negative outcomes, such as pathology.

Negative Factors

Demographics that Contribute to Risk

Certain factors may likely contribute to increased risk of negative outcomes following a traumatic event. King et al. (2012) defined a risk factor as "a characteristic

of the person, environment, or traumatic event that initiates, exacerbates, or maintains a negative response" (p. 333). These factors can be present even before a traumatic event occurs. Vogt et al. (2011) emphasized the importance of individual experiences that occur prior to trauma in a sample of veterans. The authors opined that previous experiences may actually mitigate the overall impact of traumatic exposure and should consequently be an essential part of the bio-psycho-social conceptualization (Vogt et al., 2011). For example, previous negative experiences, such as prior history of other traumatic events (Dutra & Sadeh, 2018; Vogt et al., 2011) or history of physical/sexual abuse, violence, bereavement, and other adverse childhood experiences (as mentioned in the ACEs Study), may predispose an individual to the development of psychopathological symptoms following trauma and are therefore considered risk factors (Vogt et al., 2011). Similarly, in a meta-analysis, DiGangi et al. (2013) found that prior history of mental health symptoms was a significant predictor of PTSD following trauma in 19 of 23 studies. In contrast, prior positive experiences, such as early-childhood family cohesion (Vogt et al., 2011), being female (Sattler et al., 2014), occupational support/satisfaction (Sattler et al., 2014), social support and closeness of family of origin (Vogt et al., 2011), and some coping strategies, such as problem-focused and emotion-focused coping strategies (Sattler et al. 2014), may predispose some individuals to experience less pathology and more posttraumatic growth following a traumatic event.

Childhood Experiences and Prior Trauma Exposure that Contribute to Risk

In 1998, Felitti et al. published results from the ACEs Study in which they suggested that individuals who experience abuse and neglect in early childhood are much more likely than others to develop symptoms associated with mental illness and

symptoms associated with medical illnesses and disease. This study has impacted many studies since then and continues to be cited by researchers today (Cawthorpe et al., 2018; Herzog & Schmahl, 2018). The ACEs Study outlined a clear link between early-childhood trauma and later negative outcomes and likely contributed to a change in researchers', clinicians', and society's understanding and expectations of negative outcomes associated with trauma.

One risk factor that appears to predict psychopathological symptoms is history of previous trauma, particularly in childhood (Cross et al., 2018). Cross et al. (2018) found an association between poor parenting and PTSD symptoms. In a sample of low-income African American mothers residing in an urban community, Cross et al. (2018) found that as many as 97% of individuals in this sample endorsed trauma. These traumas included early-childhood maltreatment, such as physical abuse (25%), sexual abuse (58%), witnessing domestic violence (47%), and history of medical trauma (52%). Participants who endorsed greater trauma histories were significantly more likely to endorse current symptoms of mental health distress, as well as items that corresponded to a potential for perpetrating child abuse themselves, thus providing evidence for a cyclical pattern of maladaptive behavior (Cross et al., 2018). Gold (2018) also suggested that individuals living in urban areas, particularly those of lower socioeconomic status, are more likely to experience trauma.

Research also suggests that individual characteristics predict outcomes associated with trauma. Koenen et al. (2007) found in a longitudinal study following individuals from birth through adulthood in New Zealand that in addition to such factors as low cognitive ability and neurodevelopmental events, difficult temperament significantly

predicted PTSD in individuals who had experienced at least one trauma. Similarly, Miller (2003) suggested that personality factors, specifically externalizing behaviors, or the extent to which individuals perceive events as outside of their control are also related to increased PTSD symptoms.

Coping and Risk

Another factor that may contribute to greater likelihood of developing psychopathological symptoms is maladaptive coping strategies. For the purpose of the current study, maladaptive coping is defined as those strategies that are associated with increased psychopathological symptoms and decreased posttraumatic growth. For example, in a sample of firefighters who endorsed high frequency of traumatic exposure, Sattler et al. (2014) suggested that a disengaged coping style (i.e., avoidance, distraction, or substance use) was related to more posttraumatic symptoms, greater likelihood of burnout, and less overall growth. Lawler et al. (2005) also found that avoidance coping strategies were predictive of both increased pathological symptoms and increased physical health complaints. When coping is defined in this way, studies have shown self-distraction (Mellman et al., 2001), denial (Amstadter & Vernon, 2008), behavioral disengagement (Lawler et al., 2005; Mellman et al., 2001), substance use (Ouimette et al., 1999), and self-blame (Desmet et al., 2007) to be significantly associated with higher levels of psychopathology and consequently referred to these behaviors as maladaptive.

Park et al. (2013) identified impulsivity as another risk factor that may increase an individual's engagement in such behaviors as substance use, which inadvertently increases the individual's susceptibility to traumatic exposure. In other words, the way individuals respond to trauma, including the coping mechanisms they employ, may

directly impact their likelihood of experiencing more trauma in the future. Research also suggests that individuals' immediate reactions to trauma may significantly predict later outcomes. For example, in a sample of 83 individuals who had sustained a medical trauma, Mellman et al. (2001) found that heightened arousal occurring directly after the trauma was the most salient predictor of PTSD at a 6-month follow-up. Unfortunately, their sample was comprised of mostly Hispanic male individuals presenting with one type of trauma (i.e., motor vehicle accident), so generalizability must be inferred with caution. Similarly, Kleim et al. (2012) found that an individual's early appraisal following trauma was significantly predictive of later PTSD symptoms. They suggested that the "vulnerability comprises both the way the stressful event is processed and its idiosyncratic meaning for the person's view of the self, the world, and the future (Kleim et al., 2012, p. 527). Specifically, negative appraisals, including thought suppression and rumination, appeared to predict more PTSD symptoms at 2-week and 6-month follow-ups in a sample of 222 individuals who experienced a physical assault. In summary, factors that exist prior to, during, and even after a traumatic event likely shape the overall impact of trauma on individuals.

Positive Factors

Just as risk factors have been identified for negative outcomes associated with trauma, so too have protective factors been associated with more positive outcomes. King et al. (2012) defined a protective factor as a "characteristic of the person, environment, or traumatic event that prevents, decreases, or contains a negative response" (p. 333). King et al. (2012) emphasized that protective factors can be, but are not required to be, the

inverse of risk factors. Protective factors may also be related to increased positive outcomes, such as posttraumatic growth.

Demographics that Contribute to Protection

Many factors have emphasized a connection between cognitive ability and outcomes associated with trauma, such that individuals who have higher intellectual abilities tend to experience fewer PTSD symptoms following a traumatic event. In a sample of 1,037 individuals followed from birth through adulthood in New Zealand, Koenen et al. (2007) found that high IQs predicted less pathology in individuals who had endorsed one or more traumas. Carlson et al. (2016) also found that higher education predicted fewer psychopathological symptoms in a sample of trauma survivors. These authors suggested that their findings may provide evidence for the conservation of resources theory whereby individuals with high cognitive abilities are able to better manage cognitive resources, such as attention and coping, in turn, yielding better outcomes. Cognitive abilities also may function as a mediator, such that individuals with higher cognitive abilities receive more higher education, and therefore, better outcomes.

In addition to cognitive ability, cognitive flexibility also appears to be associated with positive outcomes. Cognitive flexibility refers to the ability to experience thoughts and feelings and flexibly engage behavior that is consistent with values (Hayes, 1999). It has also been defined as an individual's "awareness that in any given situation there are options *and alternatives* available, [a] willingness to be flexible and adapt to the situation, and [the] self-efficacy in being flexible (Martin et al., 2013, p. 623). In relation to trauma, being able to simultaneously consider multiple perspectives regarding the event and its outcomes can be an asset to an individual. In a sample of 93 (88% male)

veterans, Dutra and Sadeh (2018) found that psychological flexibility was predictive of less pathology. Individuals who can generate multiple thoughts/feelings related to their trauma may be able to process it more effectively.

Individuals with higher cognitive abilities receive more higher education and subsequently better employment opportunities. Better opportunities lead to better outcomes associated with stress. For example, Sattler et al. (2014) found that greater occupational satisfaction yielded greater posttraumatic growth in a sample of firefighters. These authors also cited the conservation of resources theories to help explain their findings, that is, individuals have a tendency to strive toward valued resources, and when these resources are threatened (as they are during trauma), they must find other ways to protect these values. Cognitive flexibility helps to generate multiple solutions to this problem. Sattler et al. argued that these resources fall into one of four domains, including characteristic resources, (e.g., self-efficacy, optimism), condition resources (e.g., employment status), energy resources (e.g., time, money), and object resources (e.g., owning a car or house). In addition to early-childhood experiences, characteristic factors that influence coping may also impact outcomes associated with trauma.

Early-Childhood Experiences that Contribute to Protection

Events that occur prior to trauma exposure, even prior to one's birth, may impact one's outcome following trauma. Vogt et al. (2011) suggested that family cohesion and good parenting experiences in early childhood were significant protective factors associated with less pathology in individuals who had experienced a trauma. Other studies indicate that internal experiences, such as resilience, may account for more positive outcomes in individuals who experience trauma. Within a resilience model,

Rutter (2012) purported the existence of a "steeling" or strengthening effect some may experience following traumatic exposure. Rutter (2012) acknowledged that organisms may either become sensitized or experience a strengthening effect following a traumatic event. In the former, the organism may develop a vulnerability for future negative outcomes, similar to the model outlined by Felitti et al. (1998). However, the latter refers to a steeling effect whereby an organism is thought to build up an immunity to stressors that helps prepare the organism to cope more effectively with future stressors (Rutter, 2012).

This idea is also reflected in Taleb's concept of antifragility (Taleb & Geddes, 2012). Taleb distinguished antifragility from resilience when he explained that the opposite of fragility is not reliance, but rather an increase in strength as the result of disorder. In other words, Taleb proposed that one can benefit from adversity. It is unclear factors lead some individuals to develop negative outcomes, such as psychopathological symptoms, while other individuals seem to benefit from adversity.

Coping and Protection

Several studies suggest that problem-focused coping, emotion-focused coping, and social support are predictive of positive outcomes in individuals who have experienced a trauma. In a study of firefighters, as previously described, Sattler et al. (2014) found that individuals who endorsed positive coping strategies (i.e., problem-focused coping and emotion-focused coping) reported more posttraumatic growth. In addition, while less social support predicted high pathology, more social support predicted increased posttraumatic growth (Sattler et al., 2014). In contrast, Feder et al. (2008) did not find a significant relationship between social support and posttraumatic

growth; they found that optimism was the best predictor of posttraumatic growth compared to other adaptive coping strategies. Limits of this study included a nearly all male (97%), primarily European American sample of whom 77% had college degrees. As a result, generalizability of these results should be interpreted with caution. In a meta-analysis of 87 studies, Helgeson et al. (2006) found that individuals who searched for potential benefits in their traumatic events endorsed greater self-efficacy and more posttraumatic stress than individuals who did not appear to find benefit; these individuals also endorsed greater intrusive thoughts. The authors suggested that because the trauma has to be significant enough to call into question individuals' core beliefs, intrusive thoughts may be part of a normal recovery process necessary for individuals to make sense of their experiences and restructure thoughts associated with the trauma. The authors also noted that much of the literature seems to conceptualize intrusive thoughts (e.g., rumination in depression) as pathological when they may be part of a normal and even helpful process toward positive outcomes (Helgeson et al., 2006). Therefore, including pathology in a model predicting growth may be beneficial in adding to the understanding of this multifaceted phenomenon.

Steeling

Many factors appear to affect the impact of traumatic events on individuals. Factors that occur before, during, or after exposure may account for individual differences in presentation of cognitive, emotional, and behavioral sequelae. One of these factors, called *steeling,* suggests a model that somewhat contradicts findings from the ACEs Study. Rutter (2012) described steeling as a strengthening effect an individual may experience after experiencing a stressor. Rutter (2012) discussed steeling within a

resiliency model whereby individuals display either a steeling effect or a sensitized effect following exposure to multiple stressors. The phenomenon of steeling suggests that organisms actually benefit from stress introduced early in life much like vaccines help individuals develop antibodies to protect against later threats of harm. Rutter (2012) stated that identifying protective factors "on the basis of their nature, rather than their effects… [sometimes] work[]"; however, "protective value may come from risk experiences that lead to successful coping" (p. 336). Rutter pointed to additional evidence of this in the work completed by David Lyons' research group. For example, in their work with squirrel monkeys, Lyons et al. (2007) separated one group of 17-week-old offspring from their mothers for 2 hours per week during 10 weeks. At 27 weeks, both groups (i.e., separated and not separated) were raised in identical conditions. Behavioral, hormonal, and brain imaging data were obtained at specified ages up to adulthood. At 9 months, the groups significantly differed on a novel environment test; at 18 months, the groups significantly differed on a test of cognitive control; and at 2 ½ years, the groups significantly differed on a stress-free situation test of curiosity. On all tests, the separated group performed significantly better than the monkeys that did not experience the stressful experience of separation from their mothers. Additionally, Lyons et al. (2007) found that monkeys that were separated demonstrated significantly lower cortisol level, suggesting a decreased reactivity to stress. Neuroimaging also demonstrated significant differences as evidenced by larger ventromedial cortical volume in the monkeys that had experienced separation (Lyons et al., 2007). Rutter (2012) concluded that mild-to-moderate stress incurred early in life can inoculate organisms against later exposure to more severe stressors.

Based on past research previously described, resiliency can be defined as the ”reduced vulnerability to environmental risk experiences, the overcoming of a stress or adversity, or a relatively good outcome despite risk experiences” (Rutter, 2012, p. 337). This differs from Taleb’s antifragility (Taleb & Geddes, 2012). Resilience implies that an individual survived adversity whereas antifragility suggests that an individual thrives as the result of experiencing prior adversity. Because trauma contributes to significant changes in cognitive, neurological, and psychological processes, some of these processes might result in individuals’ improved abilities to cope with later stress. Resiliency may be challenging to operationally define because it must often be inferred; steeling may be even more challenging to identify based on its assumed existence in response to an identifiable adverse experience.

Summary

Few previous studies have assessed the cumulative predictive value of both protective and risk factors on pathology and posttraumatic growth. One potential reason, according to Carlson et al. (2016), is the inherent limitation of being able to recruit individuals after a trauma, but before symptoms have appeared. Assessing both risk and protective factors in one model may allow for a more comprehensive understanding of trauma and outcomes. Another limitation in previous research has been a seeming lack of studies exploring steeling in human samples. In order to understand whether this phenomenon is generalizable, research is needed to explore past early stressful experiences and later functioning when confronted with adversity. However, indirect examination of steeling effects may be necessary. That is, by analyzing individuals who endorse positive outcomes associated with trauma, one can then explore whether these

individuals were also more likely to have experienced earlier stressors than their counterparts who endorsed less positive outcomes following trauma. The current study purports to fill these gaps in the literature.

Using a multiple regression model, it was hypothesized that risk factors (i.e., number of traumas, heightened arousal, and number of previous pathological diagnoses) and protective factors (i.e., optimism, cognitive flexibility, and social support) would significantly predict pathology as evidenced by total scores on the Brief Symptom Inventory (BSI) in a sample of individuals who endorsed experiencing or witnessing traumatic event(s). it was also hypothesized that risk and protective factors would significantly predict posttraumatic growth, as evidenced by scores on the Post Traumatic Growth Inventory (PTGI). Using a Pearson product-moment correlation coefficient, it was hypothesized that as the number of protective factors and posttraumatic growth scores increased, pathology would decrease. Additionally, it was hypothesized that individuals who endorsed low, moderate, and high posttraumatic growth would significantly differ on the number of stressful life events endorsed in childhood as evidenced by responses on the Life Events List using a one-way analysis of variance (ANOVA). This would provide evidence in support of the existence of a steeling effect.

CHAPTER 3: METHOD

In order to test the hypotheses, participants were recruited via multiple community mental health agencies and by using online research tools. While the community mental health agencies were located in the Northeast, online recruiting strategies were able to reach individuals across the country. Participants completed eight questionnaires, including a demographic questionnaire, the Optimism Scale, the Cognitive Flexibility Scale, the Life Events Checklist (LEC-5), the PTSD Checklist, the Posttraumatic Growth Inventory (PGI), the Brief Symptom Inventory (BSI) and the Life Events List. Results were then analyzed using the Statistical Package for the Social Sciences (SPSS).

Participants

In the current study, 1,071 participants were recruited. However, 528 individuals were missing data and subsequently eliminated, leaving a sample consisting of 543 participants. Of the participants, 18.6% were male (*n* = 101), 79.7% were female (*n* = 433), and 1.7% (*n* = 9) endorsed Other as their gender. Almost half (42.4%; *n* = 230) reported being married, 31.7%t (*n* = 172) indicated being single (never married), 17.1% (*n* = 93) indicated divorced status, 3.1% (*n* = 17) indicated they were widowed, and 5.7% (*n* = 31) reported being in a domestic partnership. Of the participants, 86.6% (*n* = 470) identified as Caucasian/White, 4.8% (*n* = 26) identified as Hispanic/Latino, 3.5% (*n* = 19) identified as African American/Black, 2.0% (*n* = 11) identified as Asian/Pacific Islander, 0.6% (*n* = 3) identified as Native American, and 2.6% (*n* = 14) identified as Other.

Of the participants, 34.4% (*n* = 187) suggested they had obtained a bachelor's degree, 25.6% (*n* = 139) indicated they had a master's degree, 7.9% (*n* = 43) indicated

they had a doctoral degree, 12.3% (*n* = 67) indicated they had an associate's degree, 12.7% (*n* = 69) indicated they had a high-school diploma or GED equivalent, .2% (*n* = 1) indicated some high-school experience, and 6.8% (*n* = 37) endorsed Other. Almost half (42.5%; *n* = 231) reported they were employed full time, 9.8% (*n* = 53) suggested they were employed part time, 6.4% (*n* = 35) indicated they were self-employed, and 6.8% (*n* = 37) indicated they were currently a student. Of those who were unemployed, 7.6% (*n* = 41) suggested they were searching for employment, and 26.9% (*n* = 146) suggested they were not searching for employment. These results may reflect the current zeitgeist associated with coronavirus outbreak and subsequent mandatory quarantine, resulting in many individuals unable to work. The majority of participants (68.3%; *n* = 371) suggested they were middle class, 22.1% (*n* = 120) endorsed low socioeconomic status, and 9.6% (*n* = 52) endorsed upper class.

Inclusion and Exclusion Criteria

Inclusion criteria included individuals being older than 18 years, being able to speak English, and endorsing at least one past traumatic event. There were no additional exclusion criteria.

Screening and Recruitment

Subjects were recruited via two community outpatient mental health agencies, an online research forum, and social media. Approved flyers were distributed electronically through email to new clients as part of intake packets. Flyers contained a brief description of and link to the online study via REDCap, an online questionnaire platform, licensed to the clinical psychology department at the School of Professional and Applied Psychology at Philadelphia College of Osteopathic Medicine (PCOM). Subjects were

also recruited through Research Match, an online website designed to connect researchers with study participants who fit desired criteria, including being older than 18 years and speaking English. Using this method, a brief description of the study was provided to individuals who then could decide whether or not they were interested in participating. Those who indicated interest were provided with the link to the online REDCap survey; those who did not respond or indicated they were uninterested did not receive further communication. Subjects were additionally recruited via social media using a description of the study approved by the Institutional Review Board (IRB) with a link to the online survey. A screening measure, the LEC-5, was used to assess whether an individual had previously experienced at least one trauma. Eligible participants endorsed at least one item on the LEC-5 as evidenced by responding in the affirmative to either "this has happened to me" or "I witnessed this." Individuals who endorsed having "learned about [traumatic event(s)]," those who endorsed trauma being "part of [their] job," those who endorsed "not sure," and those who endorsed "doesn't apply" were excluded from the study, and their survey was discontinued.

Measures

Demographic Questionnaire

All participants completed a demographic questionnaire. In addition to information about age, gender, education, socioeconomic status, and marital status, other items thought to be associated with risk/protective factors and trauma were included. A list of 20 items (i.e., 10 risk factors and 10 protective factors) identified in the literature was first vetted by a group of experts in the field and ranked in accordance with the factors' perceived salience on outcomes associated with trauma. Items that ranked

higher, including previous mental health diagnosis, perceived social support, and coping, were then incorporated in the demographic survey.

Life Events Checklist

The LEC-5 (Weathers et al., 2013) was developed concurrently with the Clinician Administered PTSD Scale (CAPS) in an effort to facilitate the diagnosis of posttraumatic stress disorder (PTSD). The LEC-5 is a 17-item self-report inventory purported to assess individuals' previous exposures to potentially traumatic events. It assesses exposure to 16 events known to potentially result in PTSD or distress and includes one additional item assessing any other extraordinary stressful event not captured in the other items. The inventory uses a 6-point nominal scale including the following responses: "happened to me," "witnessed it," "learned about it," "part of my job," "not sure," or "doesn't apply." Participants were permitted to check multiple responses. Using only the two first qualifiers, "this happened to me" and "I witnessed it," a total trauma score was tallied indicating the number of traumatic events each individual endorsed. The LEC-5 has been found to demonstrate significant convergent validity with other similar scales, such as the Trauma Life Events Questionnaire (TLEQ), and has a Cronbach's alpha ranging from α = .38 for sexual assault to α= .79 for natural disasters (Gray et al., 2004).

The Optimism Scale

The Optimism Scale (Pedrosa et al., 2015) is a nine-item self-report measure used to assess the extent to which individuals have hope that something positive will happen in the future. The measure uses a 5-point Likert scale, ranging from 1 (*strongly disagree)* to 5 (*strongly agree),* in response to such items as "When I think about the future, I am positive." The Optimism Scale yields a total score; higher scores suggest more optimism,

and lower scores suggest less optimism. Although the original measure was developed in Spanish, other studies have provided significant evidence of reliability and validity using the English version with English-speaking individuals (Coelho et al., 2018). Cronbach's alpha ranged from $\alpha = 0.85$ to $\alpha = 0.93$ in various countries (Coelho et al., 2018).

The Cognitive Flexibility Scale

The Cognitive Flexibility Scale (Martin & Rubin, 1995) is a 12-item self-report measure of an individual's ability and willingness to consider various options in a situation. The inventory uses a 6-point Likert Scale to explore the extent to which individuals endorse items, such as "I can find workable solutions to seemingly unsolvable problems," with responses ranging from 6 (*Strongly Agree)* to 1 *(Strongly Disagree).* The scale yields a total score; higher scores indicate greater cognitive flexibility. According to the authors, the scale demonstrates appropriate convergent validity, divergent validity, and concurrent validity; they also found that the scale demonstrated significant test-retest reliability ($r = .83$; Martin & Rubin, 1995).

The PTSD Checklist for *DSM-5,* Modified

The PTSD Checklist for *DSM-5* (PCL-5; Weathers et al., 2013) is a 20-item self-report inventory that assesses individuals' responses to PTSD criteria in accordance with the identified symptom clusters (i.e., re-experiencing, avoidance, negative cognitions and mood, and arousal) outlined in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5;* American Psychiatric Association, 2013). Responses to such items as "feeling jumpy or easily startled" use a 5-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). A total severity score can be obtained by summing total responses or by summing symptom clusters for a total cluster severity. For the purposes

of the current study, only items from Cluster E (arousal) were used (i.e., Items 15 through 20). These six items were administered using the format previously described. A higher score on these items is suggestive of greater hyperarousal. Previous studies found high internal reliability for the full scale (α = .88) and a lesser degree for the arousal symptom cluster (α = .65; Weathers et al., 2018).

Posttraumatic Growth Inventory

The PTGI (Tedeschi & Calhoun, 1996) is a 21-item inventory that assesses the extent to which individuals psychologically benefit from exposure to a traumatic or stressful life event. The inventory uses a 7-point Likert scale, ranging from 0 *("I did not experience this change to a very great degree as a result of my crisis")* to 6 *("I experienced this change to a very great degree as a result of my crisis"),* with responses to such items as "I developed new interests." The PTGI was scored by summing the total value of endorsed items such that results indicated the total amount of posttraumatic growth each participant reported. Greater scores indicate more posttraumatic growth. Subsections of the inventory may also be summed to indicate the degree to which participants experienced growth in the five subscales. The five subscales include relating to others (α = .85), new possibilities (α = .84), personal strength (α = .72), spiritual change (α = .85), and appreciation of life (α = .67). According to Tedeschi and Calhoun (1996), internal consistency, as evidenced by Cronbach's alpha, was .90, and test-retest reliability was .71.

The Brief Symptom Inventory

The BSI (Derogatis, 1983) is a shorter adaptation from the Symptom Checklist Inventory (SCL-90) that consists of 53 items that measure psychopathological symptoms.

A 5-point Likert scale is used to assess the range of severity from 0 *(not at all distressed)* to 4 (*extremely distressed)* on such items as "Having the urge to break or smash things." Nine subscales include Somatization (α = .80), Obsessive Compulsive (α = .83), Interpersonal Sensitivity (α = .74), Depression (α = .85), Anxiety (α = .81), Hostility (α = .78), Phobic Anxiety (α = .77), Paranoid Ideation (α = .77), and Psychoticism (α = .71). Responses yield three subscores, including the Global Severity Index, the Positive Symptom Distress Index, and the Positive Symptom Total. According to Derogatis and Melisaratos (1983), test-retest reliability ranges from .68 for somatization to .91 for phobic anxiety.

Results of the BSI were analyzed using the Global Severity Index, that is, the degree to which participants experienced a total severity of all symptoms endorsed, in addition to the severity of symptoms in each of the nine categories: somatization, obsessive compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. A higher score indicates greater endorsement of pathological symptoms, while a lower score suggests less pathology.

Life Events List, Modified

In 1967, Holmes and Rahe published the Social Readjustment Rating Scale, a questionnaire comprised of 43 items assessing individuals' exposures thought to potentially contribute to stress, such as "marital separation," "death of a close family member," and "change in financial state." Since that time, many studies have used modified versions of this stress scale under such names as the Major Stressful Life Events (Henderson et al., 1981), which included a similar list of 71 items. More recently, the Laboratory for the Study of Stress, Immunity, and Disease at Carnegie Mellon

University, under the directorship of Sheldon Cohen, PhD, used a version of this questionnaire, called the Life Events List, as part of a much larger study called the Common Cold Project (2016). This version included 23 items purported to assess whether an individual experienced different potentially stressful life events. Participants were asked to indicate whether they had experienced such items as "during the last 12 months." For items endorsed, follow-up questions were used to determine whether the individual experienced the event to be positive, neutral, or negative. Then, participants were asked to rate the severity of the experience using a 6-point Likert scale ranging from 1 (*very good)* to 6 *(very bad).* This version was used in the current study. Because the current study was interested in assessing for stressful life events experienced in childhood, a few additional modifications were made. The language in the questions was changed to reflect experiences from childhood, instead of the last 12 months. Additionally, certain items were removed if they were not appropriate for childhood experiences. For example, Item 5 on the original Life Events List asks, "Were you separated or divorced during the last 12 months?"; the modified version included in the current study asked, "Did your parents/guardians separate or divorce during your childhood?" For five items, comparable modifications were not feasible, and the items were subsequently removed. This occurred for such items as "Have you been pregnant in the last 12 months?" For other items, such as "Have you or your spouse/partner or other member of your immediate family been assaulted or mugged during the last 12 months?" some answer responses including "spouse/partner" were removed from the list of potential choices. The final modified version included 18 items retained or modified from the original version. Participant responses were coded 0 if they did not endorse

having experienced the event and 1 if they endorsed having experienced the event. In this way, a total score was obtained by summing the total number of endorsed items.

Self-report measures were considered to be the best way to look at posttraumatic growth and pathological symptoms because of their advantages in time constraints and convenience; their additional benefit of anonymity may have permitted more individuals to endorse items honestly.

Procedures

All procedures for this study met requirements outlined by the IRB at PCOM. If individuals decided to participate in the study, they were directed to the online REDCap survey. All participants reviewed information about the study on REDCap before deciding to proceed. Individuals who wished to continue with participation were directed to the screener survey, the LEC-5, to determine whether they were eligible for participation. If inclusion criteria were met, participants then completed the remaining questionnaires, including the demographic questionnaire, the Optimism Scale, The Cognitive Flexibility Scale, five items from the PCL-5, the PTGI, the BSI, and the Life Events List, Modified Version. All data were downloaded from REDCap and analyzed in the SPSS.

CHAPTER 4: RESULTS

Initially, 1,071 individuals were recruited, having opened or answered part of the distributed survey. Of the 1,071 participants, 82% (n = 878) endorsed having experienced or witnessed trauma, which was an inclusion criterion to participate in the study. Of the 878 initial participants, 39 denied direct (happened to me/witnessed) experience of trauma, 284 others did not complete the survey in its entirety, and 15 individuals did not complete the demographic questionnaire. These individuals were subsequently removed. After removing 17 more participants for being outliers (i.e., data more than three standard deviations from the mean) for both dependent and independent variables, the final sample included 523 (79.9% female) participants. (See Table 1 for demographic details.)

Table 1 *Participant Demographics*

	Frequency	Percentage
Female	433	79.7
Male	101	18.6
Other	9	1.7
Caucasian	470	86.6
Black/African American	19	3.5
Hispanic/Latino	26	4.8
Native American	3	0.6
Other	14	2.6

Of the participants, 4% (n = 21) endorsed having experienced or witnessed one traumatic event, 32% (n = 166) endorsed two to four traumatic events, and 64% (n = 336) endorsed five or more traumatic events. On average, participants endorsed experiencing approximately six to seven traumatic events (M = 6.62, SD= 3.45). Total scores for pathology (BSI) ranged from 0 to 156 (M = 41.34, SD = 34.56). Posttraumatic growth scores ranged from 0 to 105 (M = 45.93, SD = 26.46). Means and standard deviations for the three risk factors (i.e., number of traumas, past mental health diagnoses, and hyperarousal) and three protective factors (i.e., optimism, cognitive flexibility, and social support) can be found in Table 2.

Table 2 *Means and Standard Deviations for Risk and Protective Factors*

	Mean	Standard deviation
Mental health Dx	0.84	1.11
Trauma endorsed	6.22	3.45
Arousal	5.61	4.43
Social support	3.56	1.12
Optimism	32.90	7.73
Cognitive flexibility	46.31	6.50

In testing the first hypothesis, analyses revealed that assumptions were met for the regression models with the exception of normality. Results indicated a linear relationship existed between the dependent variables (i.e., posttraumatic growth and pathology) and independent variables (i.e., risk and protective factors). No multicollinearity was identified between any of the risk factors or between any of the protective factors, as

evidenced by tolerance being greater than .2 for each relationship (tolerance ranged from .529 to .903; Menard, 1995) and the variance inflation factor (VIF) being less than 10 (VIF ranged from 1.108 to 1.890; Myers, 1990). The assumption of homoscedasticity was met. In the second regression model, a Durbin-Watson analysis indicated that social support, the number of previous traumas, cognitive flexibility, and optimism were non-normally distributed, as evidenced by a positive autocorrelation. However, because of the large sample size, multiple regression models tend to be robust even when the assumption of normal distribution is not met (Field, 2018).

Results from the first multiple regression indicated that the combination of the three identified risk factors (i.e., number of previous traumas, hyperarousal, and number of previous mental health diagnoses) and the three identified protective factors (i.e., optimism, cognitive flexibility, and social support) accounted for approximately 68% of the variance (Adjusted R^2 = .677) in pathology endorsed; this model was significant, $F(6,516) = 179.91$, p .001. This finding suggests that the combination of risk and protective factors significantly predicted psychopathology in the current model.

To test the second hypothesis, a second multiple regression was performed to determine if the protective and risk factors significantly predicted scores on the posttraumatic growth inventory. Prior to computing the multiple regression, a correlation matrix was used to investigate the relationships between each predictor and the outcome variable. The matrix revealed that two variables (i.e., cognitive flexibility and social support) were not significantly related to posttraumatic growth (p = .201 and p = .337, respectively) and were subsequently removed from the model. When the model excluded these variables, a significant prediction was found, $F(4,518) = 30.54$, $p < .001$, but

accounted for only 19% of the variance (Adjusted R^2 = .191). These results partially supported the second hypothesis and indicated that number of traumas, hyperarousal, previous mental health diagnosis, and optimism significantly predicted posttraumatic growth, though the effect size was small.

In testing the third hypothesis, a Pearson product-moment correlation coefficient indicated a significant positive association between the number of protective factors and posttraumatic growth, $r(521) = .240$, $p < .001$. As individuals endorsed more protective factors, they also appeared to endorse more growth following trauma. The Pearson product-moment correlation coefficient also indicated a significant negative association between the number of protective factors and overall pathology endorsed, $r(521) = -.455$, $p < .000$, suggesting that when individuals endorsed more protective factors, they endorsed less pathology following trauma. Upon further investigation, a correlation analysis revealed no significant association between posttraumatic growth and pathology, $r(521) = -.027$, $p = .269$. Despite study predictions, the amount of posttraumatic growth reported did not significantly correspond with the amount of pathology endorsed. In summary, the third hypothesis was only partially supported.

In order to test the fourth and final hypothesis, posttraumatic growth scores were divided into three groups: low (0-34), moderate (35-69), and high (70-105). Next, a one-way analysis of variance (ANOVA) was performed to determine whether individuals who endorsed low, moderate, and high posttraumatic growth would significantly differ on the number of stressful life events endorsed on the Life Events List. The results from the ANOVA were not significant, $F(2,496) = 2.68$, $p = .069$. Individuals who endorsed low posttraumatic growth ($M = 24.52$, $SD = 24.52$), moderate posttraumatic growth ($M =$

25.11, *SD*= 3.39), and high posttraumatic growth (*M* = 25.39, *SD* = 3.27) did not differ significantly on the number of stressful childhood events endorsed. In other words, the fourth hypothesis was not supported; individuals who experienced more posttraumatic growth did not differ in the amount of childhood stress endorsed. Therefore, there was no evidence of a steeling effect that would have suggested early-childhood stress functions to inoculate individuals against later traumatic outcomes.

CHAPTER 5: DISCUSSION

Based on the results, models that include both risk and protective factors significantly account for the variance in the prediction of pathology. The model that included number of previous traumas, hyperarousal, and previous mental health diagnoses, as well as social support, optimism, and cognitive flexibility, accounted for 68% of pathology endorsed.

In the second multiple regression model, protective and risk factors significantly predicted scores on the posttraumatic growth inventory (PTGI). However, a correlation matrix revealed that two variables (i.e., cognitive flexibility and social support) were not significantly related to posttraumatic growth and were subsequently removed from the model. When the model excluded these variables, a significant prediction was found but accounted only for 19% of the variance. These results partially supported the second hypothesis and indicated that number of traumas, hyperarousal, previous mental health diagnosis, and optimism significantly predicted posttraumatic growth, though the effect size was small.

The third hypothesis was partially supported as evidenced by finding a significant positive association between the number of protective factors and overall posttraumatic growth reported. Another finding included a significant negative association between the number of protective factors and overall pathology endorsed. Notably, no significant correlation was found between posttraumatic growth and overall pathology endorsed. The extent to which individuals endorsed growth appeared unrelated to amount of pathology experienced and vice versa.

Regarding the fourth hypothesis, although individuals who endorsed varying (i.e., low, moderate, and high) amounts of posttraumatic growth differed on the number of early-childhood stressful life events reported, this trend was not significant.

Interpretation and Implication

The finding that risk and protective factors congruently predict pathology is congruent with previous literature and suggests that identifying both risk and protective factors may be beneficial when attempting to predict outcomes, particularly in individuals with trauma. This is similar to research on suicidality that incorporates both risk and predictive factors in the comprehensive assessment of suicide (Janiri et al., 2020). As Janiri et al. (2020) indicated, clinical understanding for any particular individual is enhanced when both risks known to be associated with negative outcomes and protective factors known to be associated with positive outcomes are simultaneously accounted for in the conceptualization of severity of risk for suicide. Similar to the research on suicide, incorporating protective factors in addition to risk factors appears to increase the predictive value of a model and may be helpful to consider when providing treatment to individuals with trauma. Considering an individual's risk and protective factors may help clinicians identify who is more likely to experience posttraumatic stress disorder (PTSD) or other symptoms of pathology following a trauma. Similarly, identifying and enhancing protective factors, such as interventions aimed at facilitation of social support, may be beneficial in providing treatment to these individuals.

One explanation for the finding that risk and protective factors only partially predicted posttraumatic growth may be that the journey toward posttraumatic growth is highly personal and, therefore, may not be highly related to experiences that rely on other

individuals. For example, Wozniak et al. (2020) found that deliberate rumination was predictive of more posttraumatic growth, whereas unintentional rumination was not. These findings suggest that the way in which individuals perceive intrusive thoughts related to trauma and the extent to which they perceive their abilities to control these experiences may have an impact on outcomes associated with trauma. This process may not significantly depend on social support from others, consistent with the findings in the current study.

Another explanation may be that other protective factors are stronger predictors of posttraumatic growth than the three identified in the current study. While a review of the literature identified many other protective factors, such as temperament/personality (Dutra & Sadeh, 2018; Rutter, 2012), cognitive ability (Bolton et al., 2017), internal locus of control and adaptive coping (Sattler et al., 2014), and self-efficacy (Helgeson et al., 2006), no identified studies have compared predictive values of protective factors to determine which factors are most salient for posttraumatic growth. Posttraumatic growth may be related to factors unidentified in the current study, such as whether one receives psychotherapy following trauma exposure. Also, the mechanisms of action that yield pathology may be inherently different from those that yield growth. A final explanation for the findings may be the result of time as a confounding variable, as the current study did not take into account the amount of time elapsed between the time of the traumatic event and the current items endorsed. Time and experiences incurred, such as whether an individual receives psychotherapy, may contribute to outcomes associated with trauma, including posttraumatic growth.

The finding that the number of protective factors was positively correlated with posttraumatic growth suggests that as protective factors increase, individuals experience better outcomes following trauma, as evidenced by more posttraumatic growth and less pathology. This finding provides evidence for the existence of a dosage effect for protective factors that parallels the dosage effect of risk factors associated with trauma. In other words, the more protective factors an individual endorses, the better the individual seems to fare following trauma. Although social support and cognitive flexibility did not significantly contribute to the prediction of posttraumatic growth in the current study, other protective factors that were not examined, such as meaning-making, the role of core beliefs, and evidence-based mental health treatment, may yield growth. However, there was no significant correlation between posttraumatic growth and pathology, possibly suggesting that the mechanisms of action associated with the development of growth and the development of pathology following trauma are independent. Interestingly, this is congruent with the findings in the second regression model (Hypothesis 2).

The finding that individuals with varying amounts of posttraumatic growth did not significantly differ in the number of mild childhood stressful life events did not demonstrate strong evidence in support of the existence of a steeling effect. Perhaps individuals develop somewhat of an inoculation to stress over time; however, this process remains largely unclear at this time.

Limitations

This study has a number of innate limitations. Using a convenience sample of individuals recruited via an online research forum may not yield results that are

generalizable to other populations. Additionally, because of the self-report measure, participants may not have responded honestly or accurately. In addition, individuals' interpretations of events related to past trauma may be distorted by the passage of time, treatment they had received since the trauma, or other confounding factors not controlled for in this study. Another limitation relates to the specific protective and risk factors identified. Because the literature to date lacks a comprehensive understanding of which factors most saliently predict outcomes associated with trauma, factors for the current study were chosen following suggestions from a panel of experts; however, other more salient factors that were not accounted for in the current project may exist.

Future Directions

Future research should explore which protective factors appear to be most salient in the prediction of posttraumatic growth and which risk factors appear to be most salient in the prediction of pathology following trauma exposure. This could ultimately lead to the development of comprehensive assessment tools that examine individuals' risk and protective factors concurrently. Furthermore, knowing which protective factors are most salient in the prediction of growth could inform future clinical interventions. For example, as optimism appeared to significantly predict growth, treatment interventions aimed at bolstering a client's positive outlook on the future should be prioritized.

Future research should also explore the role of appraisal in understanding the link between trauma exposure and one's reaction to an event(s). Specifically, understanding an individual's schemas, such as meaning-making or acceptance, following a traumatic event may significantly impact cognitive and behavioral patterns; factors related to culture, family, and development may also likely impact overall outcomes related to

trauma. Additionally, more research needs to uncover the extent to which previously established appraisals are maintained during and after traumatic exposure. For instance, whether appraisals remain relatively consistent during and following trauma exposure is unclear.

While the findings of the current study did not provide significant evidence of the existence of a steeling effect, a trend seemed to emerge that different levels of growth reported were associated with varying amounts of stress experienced in childhood. Future research could further explore this phenomenon whereby individuals may experience biological, social, or psychological changes following exposure to mild-to-moderate stressors early in life that appear to steel them or to strengthen their ability to cope with future significant stressors.

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